

Responses of Sea Surface Temperature and Sea Level to Wind Forcing in the Tropical Pacific

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Ocean surface wind stresses between 1987 and 1995 were derived from observations of the Special Sensor Microwave Imager (SSM/I) and the microwave scatterometer on the European Remote Sensing (ERS-1) spacecraft. They were used to force a primitive equation ocean general circulation model. The model simulations of sea surface temperature and sea level were evaluated with spacebased measurements from the Advanced Very High Resolution Radiometer (AVHRR) and the microwave altimeters on Geosat and Topex/Poseidon, and in situ measurements at drift gauges and moored buoys. The theoretical links between observed forcing and response are studied through model simulations. The study covers El Niño and Southern Oscillation events both in the eighties and the nineties; events in the eighties are much more intense and have strong cool phases which the events in the nineties lack. Spacebased wind fields produce more realistic anomalous ocean thermal response than wind fields from operational numerical weather forecast models in many respects. The differences in wind-driven upwelling and thermocline lifting are found to be the main cause of the differences in ocean thermal responses to different wind forcing fields.